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AUTHOR Haywood, Kathleen M.
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AVAILABLE FROM Dr. Kathleen Haywood, Department of Behavioral Studies, University of Missouri, 8001 Natural Bridge Road, St. Louis, Missouri 63121

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ABSTRACT

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# Children's Basketball Performance with Regulation and Junior-Sized Basketballs

Kathleen M. Haywood

University of Missouri--St. Louis

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## Abstract

The smaller size and lower strength level of children may indicate that adaptations of sport-type games, such as basketball, are necessary to maximize skill performance. Children between the ages of 9.0 and 12.7 years were given two subtests of the AAHPER Basketball Skills Test, the Speed Pass and Front Shot. Each subject performed once with a regulation basketball and once with a junior-sized basketball. Performance on both tests improved with increasing age and experience. All subjects performed better on the Speed Pass test with the junior ball, as did children under 10.5 years on the Front Shot test. Boys also performed better than girls on the Front Shot test.

Children's Basketball Performance with Regulation and Junior-Sized Basketballs

The official rules of most team sports are written for adult participants. Teachers in physical education programs and organizers of recreational programs for children have often found it necessary and practical to change the official rules of many sports to maximize the skill performance of children. It is well known that children differ from adults, not only in absolute size and strength, but in the relative proportions of their trunk and limb lengths. Such relative differences may change the length of resistance and force arms (Teeple, 1976).

One change possible in basketball games is use of the "junior" basketball. This ball is identical in appearance to the regulation ball but approximately 2 in. smaller in circumference and 2 oz. lighter in weight. The smaller hand size and lower strength level of children would appear to make ball-handling and distance-shooting tasks easier for children using the junior ball. The purpose of the present study was to examine the relationship between basketball size and children's performance on such tasks.

## Method

Subjects. The children tested in this study, 31 boys and 31 girls, ranged in age from 9.0 to 12.7 years. All of the subjects

either played on a basketball team which practiced at lease once a week and played a weekly game in an organized league, or were enrolled in a weekly youth sports program which provided basketball instruction.

Procedures. As each subject reported to the testing area, the palm width of the dominant hand at the first phalangeal-metacarpal joints was measured. The maximum first finger to fifth finger spread was also taken. Each child was then given the Speed Pass and Front Shot subtests of the AAHPER Basketball Skills Test (Skills Test Manual: Basketball for Boys, 1966). The Speed Pass test was used as a measure of ball handling performance and the Front Shot test as a measure of distance shooting performance. Reliability criteria for the AAHPER skill tests had been established as .70 for accuracy and form events. The Speed Pass test was administered and scored as specified, once with a regulation basketball and once with a junior basketball. In this test the subject passes the basketball against a wall 10 times as fast as possible from 9 ft. The score is the fastest time of two complete trials. The Front Shot test was also administered as specified, but 15 trials with each type of ball were given. The subject shot from a spot just to the left of the free throw line, receiving 2 points for a basket and 1 point for a miss which first hit the rim. Half the subjects initially took the tests with the regulation ball while the other half began with the junior ball.

## Results

Hand Measures. The mean palm width of all subjects in the present study was found to be 7.4 cm and the mean hand spread 19.1 cm. In contrast, college players on a varsity basketball team were found to have mean palm widths of 8.4 cm for women and 9.5 cm for men, and mean hand spreads of 21.6 cm for women and 23.7 cm for men.

Speed Pass. An initial subjects X sex X testing order X ball size (62 X 2 X 2 X 2) ANOVA with subjects nested in sex and testing order showed ball size to be the only significant factor in the analysis, $F$ (1,58) = 9.87, $p < .003$. A second ANOVA was calculated with the subjects divided into three age groups, 9.0-10.5 yrs., 10.6-11.5 yrs., and 11.6-12.7 yrs., because performance differences with age were noted during testing. Division of the age groups at 10.5 and 11.5 years grouped the subjects on experience level as well as age. Mean performance scores for each age group are given in Table 1 and results of the subjects X age group X ball size (62 X 3 X 2) ANOVA with subjects nested in age group are shown in Table 2. As can be seen, performance on the Speed Pass improved with age and experience, but at each age subjects performed better with the junior basketball.

Table 1

Mean Hand Measures and Performances Scores

| AGE GROUP (yrs) | N | HAND WIDTH (cm) M | HAND WIDTH (cm) SD | HAND SPREAD (cm) M | HAND SPREAD (cm) SD | SPEED PASS (sec.) Regulation M | SPEED PASS (sec.) Regulation SD | SPEED PASS (sec.) Junior M | SPEED PASS (sec.) Junior SD | FRONT SHOT (points) Regulation M | FRONT SHOT (points) Regulation SD | FRONT SHOT (points) Junior M | FRONT SHOT (points) Junior SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.0-10.5 | 14 | 7.1 | .6 | 18.3 | 1.4 | 17.4 | 6.4 | 16.8 | 5.6 | 4.8 | 5.1 | 6.9 | 6.0 |
| 10.6-11.5 | 20 | 7.3 | .4 | 18.8 | 1.10 | 13.4 | 2.1 | 12.9 | 1.5 | 12.0 | 4.4 | 9.9 | 4.2 |
| 11.6-12.7 | 28 | 7.5 | .5 | 19.8 | .8 | 13.0 | 1.6 | 12.7 | 1.7 | 12.6 | 6.0 | 12.0 | 4.0 |

Table 2

Summary of ANOVA for Speed Pass Test

| Source | df | MS | F | p |
|---|---|---|---|---|
| Age Group | 2,59 | 189.73 | 8.84 | .001 |
| Ball Size | 1,59 | 7.45 | 9.66 | .003 |
| Age Group X Ball Size | 2,59 | 0.24 | 0.31 | .731 |

Front Shot. After a preliminary ANOVA showed that testing order was not a significant factor in Front Shot performance, a subjects X sex X age group X ball size (62 X 2 X 3 X 2) ANOVA with subjects nested in sex and age group was conducted. This placed an unequal number of subjects in each cell, hence an unweighted means analysis was used. Subjects were again divided into age groups because differences in performance with age were noted during testing. As the mean performance scores and summary of the ANOVA presented in Table 3 show, performance on the Front Shot improved with age and experience.

Table 3

| Source | df | MS | F | p |
|---|---|---|---|---|
| Sex | 1,56 | 252.40 | 6.23 | .015 |
| Age Group | 2,56 | 404.86 | 10.00 | .001 |
| Ball Size | 1,56 | .90 | .13 | .720 |
| Sex X Age Group | 2,56 | 16.63 | .41 | .665 |
| Sex X Ball Size | 1,56 | 17.05 | 2.45 | .123 |
| Age Group X Ball Size | 2,56 | 33.57 | 5.12 | .009 |
| Sex X Age Group X Ball Size | 2,56 | 6.84 | .98 | .380 |

The youngest age group performed better with the junior basketball while the older children performed better with the regulation basketball. Boys scored higher than girls on the Front Shot with a mean score of 11.4 points compared to 8.3 points.

## Discussion

The results of this study indicate that, at least on the Speed Pass test, the ball-handling performance of young children is significantly better with the smaller, junior basketball than the regulation ball. The mean hand spread of the children in the present study was about 25% of the circumference of a regulation ball but 27% of a junior basketball. The mean hand spreads of a typical women's and men's collegiate basketball team were found to be 28% and 31% of the regulation ball circumference. The hand-size to ball-size ratio for children using the junior ball is therefore much closer to that of adults performing skills with the regulation ball. Ball-handling skills may be mechanically more similar under these circumstances.

The young children tested here found it difficult to reach the basket with shots at the distance stipulated on the Front Shot test. However, they score much higher as a group with the lighter, junior basketball than the regulation basketball. This was not true for the older groups, who actually performed better with the regulation ball. It may be that, with increased strength to propel the ball to the basket, the older groups had practiced this accuracy task more with the regulation ball than the junior ball. The results do imply that, at least for children under 10.5 years of age, distance shooting is more accurate with the lighter ball. Strength and

experience factors may also explain the higher mean performance scores of boys compared to girls on the Front Shot test.

This study has considered the performance of children on just two basketball skill tests thought to be indicative of ball-handling and distance-shooting performance. Within these limits, it appears there is a basis for adopting official basketball rules to allow for use of the junior basketball, especially among children under 10.5 years of age. Other changes in the official basketball rules may be appropriate and beneficial for children, such as use of a lower basket height. The worth of any such changes, however, may be examined empirically so that only beneficial changes will be made when participation in sport-type games is desired by children.

## References

Skills Test Manual: Basketball for Boys. Washington, D.C.: American Association for Health, Physical Education and Recreation, 1966.

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## Author Notes

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Requests for reprints should be sent to Dr. Kathleen Haywood, Department of Behavioral Studies, UMSL, 8001 Natural Bridge Road, St. Louis, Missouri 63121.